including the three groups, more than 1200 ladies attended the Manchester meeting, instead of 493 only. Again, of the ladies at the recent Bath meeting, there were 84 members, *plus* 455 associates, *plus* the, to me, unknown number who took "ladies' tickets."

WM. PENGELLY.

Torquay, December 18.

On the Formulæ of the Chlorides of Aluminium and the Allied Metals.

IN recent numbers of NATURE there have appeared several interesting accounts of determinations of the vapour-densities of certain metallic chlorides. According to the views generally held by chemists, the molecules of some of these chlorides should be represented by the general formula M_2Cl_6, but conclusions are drawn from the experiments described (1) that the formula MCl_3 is applicable to all these chlorides; (2) that the chlorides of the formula M_2Cl_6 are probably incapable of existence in the gaseous state, and that this formula should therefore be given up; (3) that the lower chlorides of these metals should be expressed by the general formula MCl_2 instead of M_2Cl_4, chlorides corresponding to the second formula being incapable of existence.

In view of the great interest that is felt in this question at the present time, it seemed to me that a tabulated statement of the results obtained by various chemists would be of value, in order that a comprehensive view of the question might be obtained:—

VAPOUR-DENSITIES (AIR = 1) OF CHLORIDES, &c.

Aluminium chloride: M.P. 187°; B.P. 183°. Calc. $\begin{cases} Al_2Cl_6 = 9·2. \\ AlCl_3 = 4·6. \end{cases}$

Temperature.	Pressure.	Vapour-Density.	Method.	Observer.	Remarks.
° C.					
350	1 atm.	{9·38 9·32} 9·35	Dumas	Deville and Troost	
440	,,	{9·34 9·33 9·37} 9·35	,,	,,	
		No result	V. Meyer	V. Meyer	Dissociated at 697°.
218	0·59 atm.	8·87	Dumas	Friedel and Crafts	In a later paper these observers state that they heated aluminium chloride to a very high temperature, and allowed the vapour to diffuse through a porous substance, but were unable to detect the presence of free chlorine.
218·3	0·88	9·17			
218·3	0·99	9·69			
218·1	0·39	9·54			
218·1	0·29	9·34			
218·1	0·40	9·93			
263·2	0·98	9·50			
263·7	0·99	9·51			
306·5	0·97	9·46			
306·5	0·95	9·44			
356·9	0·89	9·34			
356·9	0·97	9·17			
357·3	0·96	9·42			
398·2	0·97	9·20			
390	0·79	9·11			
400	0·95	9·27			
415	0·57	8·73			
429	0·97	8·31			
429	0·54	8·71			
429	0·87	8·39			
433	0·90	8·96			
440		7·79	V. Meyer	Nilson and Pettersson	
758		4·80			
835		4·54			
943		4·56			
1117		4·27			Platinum vessel attacked, showing the presence of free chlorine.
1244		4·25			
1260		4·28			

Aluminium bromide $\begin{cases} AlBr_3 = 9·2. \\ Al_2Br_6 = 18·4. \end{cases}$

Temperature.	Pressure.	Vapour-Density.	Method.	Observer.	Remarks.
440	1 atm.	18·62	Dumas	Deville and Troost	

Aluminium iodide $\begin{cases} AlI_3 = 14·0. \\ Al_2I_6 = 28·1. \end{cases}$

Temperature.	Pressure.	Vapour-Density.	Method.	Observer.	Remarks.
440	1 atm.	27·00	Dumas	Deville and Troost	

Aluminium ethyl: B.P. 194°. $\begin{cases} Al(C_2H_5)_3 = 3·93. \\ Al_2(C_2H_5)_6 = 7·86. \end{cases}$

Temperature.	Pressure.	Vapour-Density.	Method.	Observer.	Remarks.
234	?	4·5	Gay Lussac	Buckton and Odling	
235		8·0 + 8·2 = 8·1	V. Meyer	Louïse and Roux	
258		6·0, 6·3, 6·4 = 6·2			
310		2·5			Complete decomposition
350		2·5			

Louïse and Roux obtained results agreeing with the formula $Al_2(C_2H_5)_6$ by Raoult's freezing-point method, employing ethylene dibromide as solvent.

Aluminium methyl : B.P. 130°. $\left\{\begin{array}{l}Al(CH_3)_3 = 2{\cdot}48.\\ Al_2(CH_3)_6 = 4{\cdot}97.\end{array}\right.$

Temperature. ° C.	Pressure.	Vapour-Density.	Method.	Observer.	Remarks.
130		$\left\{\begin{matrix}4{\cdot}36\\ 4{\cdot}40\end{matrix}\right\}4{\cdot}38$	Gay Lussac	Buckton and Odling	
163		4·10			
160		4·10			
162		3·90			
240		2·80			
220		2·80			
220		2·81			

Gallium chloride : B.P. 215°–220°. $\left\{\begin{array}{l}GaCl_3 = 6{\cdot}1.\\ Ga_2Cl_6 = 12{\cdot}2.\end{array}\right.$

247	1 atm.	13·4	Dumas	Lecoq de Boisbaudran	
273	,,	11·9			
357	,,	10·0			
440	,,	7·8			
307	0·87	10·61	,,	Friedel and Crafts	
357·15	0·64	9·08			
377·6	0·57	7·82			
237·0	0·24	11·73			
357		8·5	V. Meyer	Friedel	
440		6·6			
350		8·85	,,	Nilson and Pettersson	
440		6·12			
606		6·14			
1000–1100		5·18			

Gallium dichloride, $GaCl_2 = 4{\cdot}86$.

1000–1100		4·82	V Meyer	Nilson and Pettersson	
1300–1400		3·57			

Indium trichloride $\left\{\begin{array}{l}InCl_3 = 7{\cdot}58.\\ In_2Cl_6 = 15{\cdot}17.\end{array}\right.$

Dull red		7·87	V. Meyer	V. and C. Meyer	
606		8·16	V. Meyer	Nilson and Pettersson	Slow volatilization
850		7·39			Rapid volatilization
1048		6·72			
1100–1200		6·23			

Indium dichloride, $InCl_2 = 6{\cdot}36$.

958		7·67	V. Meyer	Nilson and Pettersson	
1167		6·54			
1300–1400		6·43			

Indium monochloride, $InCl = 5{\cdot}14$.

1100–1150		5·30	V. Meyer	Nilson and Pettersson	
1200–1300		5·38			
1300–1400		5·53			

Chromium trichloride $\left\{\begin{array}{l}Cr_2Cl_6 = 10{\cdot}96.\\ CrCl_3 = 5{\cdot}48.\end{array}\right.$

1065		6·13	V. Meyer	Nilson and Pettersson	Slow volatilization
1191		5·52			Normal ,,
1277		5·42			
1347		4·83			
1100–1200		5·67			
1250–1350		5·18			
1350–1400		4·58			
Very high		Mol. wt. = 154·9 Calc. for $CrCl_3$ = 159	V. Meyer	A. Scott	

Chromium dichloride $\left\{\begin{array}{l}CrCl_2 = 4{\cdot}26.\\ Cr_2Cl_4 = 8{\cdot}51.\end{array}\right.$

1300–1400		7·80	V. Meyer	Nilson and Pettersson	Very difficult to volatilize
1400–1500		7·28			
1500–1600		6·24			

Ferric chloride $\left\{\begin{array}{l} FeCl_3 = 5{\cdot}60. \\ Fe_2Cl_6 = 11{\cdot}19. \end{array}\right.$

Temperature.	Pressure.	Vapour-Density.	Method.	Observer.	Remarks.
° C.					
440	1 atm.	$\left\{\begin{array}{l}11{\cdot}42\\11{\cdot}37\end{array}\right\}$ 11·39	Dumas	Deville and Troost	
440		$\left\{\begin{array}{l}10{\cdot}75\\10{\cdot}97\end{array}\right\}$ 10·86	,,	Friedel and Crafts	In atm. of nitrogen
321·6	0·23	11·41	,,	,,	In atm. of chlorine
325·2	0·19	12·47			
356·9	0·12	12·04			
357·0	0·50	11·85			
442·2	0·27	11·66			
442·2	0·14	11·30			
440		11·14	V. Meyer	V. Meyer	
619		11·01	,,	,,	
Very high		Molecular weight = 136·1 ; $FeCl_3$ = 162·5	,,	A. Scott	
448		10·49	,,	Grünewald and Mayer	Dissociation above 518°, with liberation of chlorine.
518		9·57			
606		8·38			
750		5·40			
1050		5·21			
1300		5·13			
448 518		Same as above			In atm. of chlorine

Ferrous chloride $\left\{\begin{array}{l} FeCl_2 = 4{\cdot}39. \\ Fe_2Cl_4 = 8{\cdot}78. \end{array}\right.$

Yellow heat		$\left\{\begin{array}{l}6{\cdot}67\\6{\cdot}38\end{array}\right\}$ 6·52	V. Meyer	V. Meyer	
1300–1400		4·34	,,	Nilson and Pettersson	
1400–1500		4·29			

It has been pointed out by Messrs. Friedel and Crafts that the method of Dumas has this advantage over that of Victor Meyer, that the pressure of the vapour can be accurately ascertained, whereas in Meyer's apparatus diffusion takes place to an unknown extent, so that the actual pressure of the vapour is indeterminable.

It appears to me that the following conclusions, which are in general accordance with the views of Friedel and Crafts, may be drawn from the results so far obtained :—

Aluminium Compounds.—The evidence in favour of the existence of the molecules Al_2R_6 is overwhelming, but it is probable that at high temperatures they undergo dissociation, thus $Al_2R_6 = 2AlR_3$,

Gallium Trichloride.—The results point to the existence of Ga_2Cl_6 at low temperatures, and $GaCl_3$ at high, the more complex molecules undergoing dissociation.

Gallium Dichloride.—Most probably $GaCl_2$.

Indium Chlorides.—Formulæ probably $InCl_3$, $InCl_2$, $InCl$; very little indication of the existence of the more complex molecules, but the results are all by V. Meyer's method.

Chromium Chlorides.—The trichloride $CrCl_3$ undoubtedly exists; little or no evidence in favour of Cr_2Cl_6. The dichloride, even at the highest temperature reached, appears to consist largely of molecules of the formula Cr_2Cl_4.

Iron Chlorides.—All the results by Dumas's method, and those of V. Meyer by his own, point to the stability of the molecule Fe_2Cl_6 up to 500° or 600°. The values obtained by Grünewald and Mayer probably point to dissociation into the simpler molecules $FeCl_3$, but since they observed the liberation of free chlorine above 518°, and as the results above 750° are lower even than that calculated for the simple molecule $FeCl_3$, there is clearly necessity for caution in drawing deductions from the experiments.

The values obtained for ferrous chloride indicate, as far as they go, a gradual dissociation of Fe_2Cl_4 into $FeCl_2$.

SYDNEY YOUNG.

University College, Bristol, November 6.

THE UTILITY OF SPECIFIC CHARACTERS.

THE question of the utility or inutility of specific characters is one which is of considerable importance in the philosophy of biology on account of its connection with the action of natural selection ; and it is one which is of special interest at the present time, because of the attention which has been drawn to it by Dr. Romanes's essay on physiological selection, by the Presidential address to the Biological Section at the recent meeting of the British Association, and by various letters and articles in NATURE and elsewhere. This is a matter upon which a biologist who is practically acquainted with species can alone express an authoritative opinion. It is only the naturalist who has an intimate knowledge of the characteristics and the habits of species who can judge accurately of the relations between such structural features and the animal's habits and surroundings, and who can appreciate the fact that many structures or variations of structure may be of importance, although their precise functions and relations to environment may not yet be known.

The more minutely a group of organisms is studied, the more the object or utilitarian significance of the specific characters becomes evident. In the Tunicata, the class of animals I happen to have paid most attention to of late years, I am convinced of the practical importance or usefulness of the recognized specific modifications :—such as the condition of the muscular system, the arrangement of the vessels in the branchial sac, the number and arrangement of the tentacles, and so on—these structures being all related to most important functions, such as respiration and the regulation of the food-supply. Even in the case of such apparently trivial characters as the shapes and